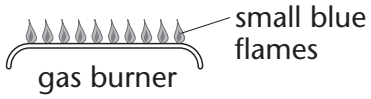
H Using chemistry

End of unit test
Red

1 The diagram shows a gas burner.



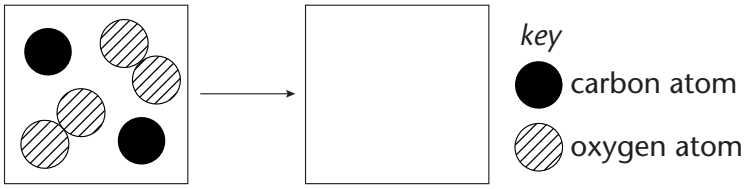
a Write a word equation for the burning of methane in oxygen. *2 marks*

b Hydrogen can be used as a fuel in motor vehicles in place of petrol. It burns in air to produce water.

Write down **one** advantage of using hydrogen as a fuel, compared with using petrol or diesel. *1 mark*

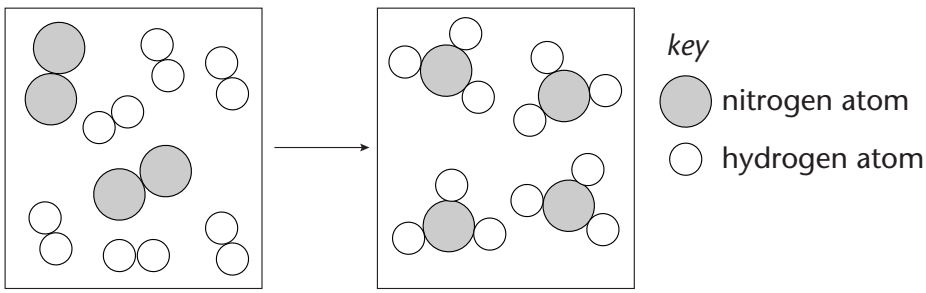
2 Carbon burns in oxygen to form carbon dioxide (CO_2).

a Copy and complete the diagram showing the changed arrangement of particles when this reaction takes place. *2 marks*



b What is released, in addition to carbon dioxide, when carbon is burned? *1 mark*

c The diagram shows how nitrogen and hydrogen can react to form ammonia.



How does the diagram show that the mass of the reactants and products is the same? *1 mark*

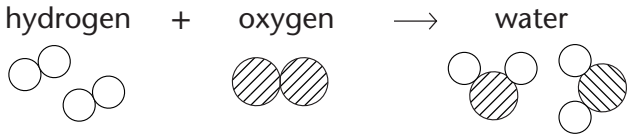
d When copper carbonate is heated, carbon dioxide gas is given off and black copper oxide is left.

i Why is the mass of copper oxide left less than the mass of copper carbonate that was heated? *1 mark*

ii Copy and complete the symbol equation for the reaction. *1 mark*

$CuCO_3$ → ..... + ...

e The equation below shows the reaction between hydrogen and oxygen to produce water.



How does the number of atoms in the equation show that mass is conserved in the chemical reaction? *1 mark*

3 Copper, zinc and magnesium are added to separate samples of silver nitrate solution.

a Copy and complete the word equation. *2 marks*

copper + silver nitrate → ..... **+** .....

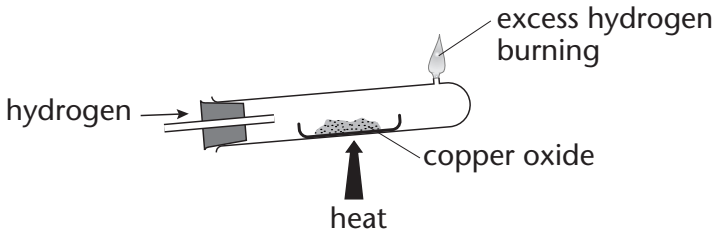
b Here is a list of four metals in decreasing order or reactivity:
magnesium
zinc
copper
silver
Jenny carries out the following reaction:

A magnesium with silver nitrate solution
B copper with silver nitrate solution
C zinc with silver nitrate solution.

i Which combination of metals shown above will release the most energy, **A, B** or **C**? *1 mark*

ii Which combination of metals shown above will release the least energy, **A, B** or **C**? *1 mark*

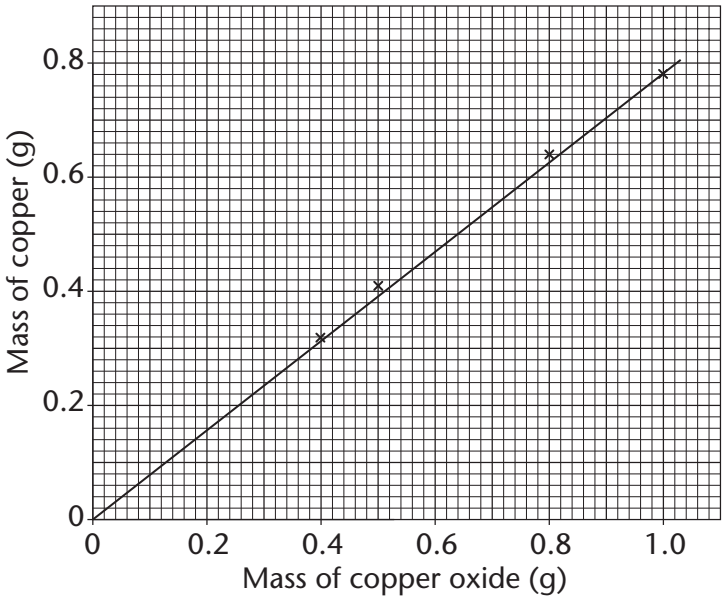
4 The diagram shows apparatus that can be used to turn copper oxide into copper. Water is also produced.



a Write a symbol equation for the reaction? *2 marks*

b Explain why the mass of the test tube and contents decreases during the reaction. *2 marks*

Groups of students did this experiment with different masses of copper oxide. Here is a graph showing their results.



c Use the graph to find the mass of copper oxide needed to produce 0.50 g of copper. *1 mark*

d Copper can be converted into copper oxide.

What mass of copper oxide would be produced from 0.64 g of copper? *1 mark*

5 A new source of protein called mycoprotein has been developed for human food. It is made by growing a fungus on glucose derived from maize starch. The harvested mycoprotein is made to look and taste like meat and is marketed under the brand name Quorn.

This is the nutrition information table for mycoprotein:

Constituent	Mass (g per 100 g)
Protein	12.0
Dietary fibre	6.0
Fat	3.0
Carbohydrate	3.0
Sodium	0.005
Cholesterol	0.0
Water	75.0

When an ingredient like mycoprotein is being developed, scientists use small-scale experiments using laboratory-size flasks. When they are sure everything is working properly, a full-size production factory is built.

a Why do scientists think it is important to carry out small-scale experiments before building full scale factories? *1 mark*

This table shows the nutritional information for a typical fast-food cheeseburger:

Constituent	Mass (g per 100 g)
Protein	15.6
Dietary fibre	1.5
Fat	13.4
Carbohydrate	30.0

b i How does the amount of dietary fibre in 100 g of mycoprotein compare with that in 100 g of cheeseburger? *1 mark*

Using chemistry (continued)

Many doctors are very concerned that we have a diet that is too high in carbohydrate and fat.

ii Use the nutritional information tables to suggest how eating foods made with mycoprotein might help to improve our diet. *1 mark*

Mycoprotein was developed because in the 1950s scientists predicted a world-wide shortage of high protein foods. High protein foods are usually meat or fish which are expensive to produce and the animals take many months to grow before they can be used for meat.

Mycoprotein in Quorn is made by growing a fungus on glucose derived from maize starch. Once harvested, it can be made to look and taste like meat. The process takes several weeks.

c Suggest two reasons why scientists think that mycoprotein may be an answer to a shortage of protein rich foods for humans. *2 marks*